

IN THE ABSTRACT OF THE DISCLOSURE:

Please amend the abstract as follows:

ABSTRACT OF THE DISCLOSURE

~~The present invention prevents a~~ A frame-like luminance difference is prevented from being generated in a portion which surrounds a light transmissive region of a pixel in a liquid crystal display device. In a pixel region formed on a substrate, a first pixel electrode formed of a light transmissive conductive layer is formed in one light transmissive region₁ which is formed by partitioning the pixel region₁ and a second pixel electrode formed of a non-light transmissive conductive film is formed on the ~~other~~ remaining light reflective region. The first pixel electrode is positioned as a lower layer with respect to an insulation film. A hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the first pixel electrode. The second pixel electrode is formed on a light reflective region of the insulation film. Light shielding is performed at a portion corresponding to a side wall surface of the hole formed in the insulation film.

IN THE CLAIMS:

Please amend claims 1-7 as follows:

1. (currently amended) A display device ~~being~~ characterized in that:

in a pixel region formed on a substrate, a first pixel electrode formed of a light transmissive conductive layer is formed in one optical transmissive region₁ which is formed by partitioning the pixel region₁ and a second pixel electrode formed of a non-light transmissive conductive film is formed on the ~~other~~ remainder of the partitioned pixel region to form a light reflective region₂;

the first pixel electrode is positioned as a lower layer with respect to an insulation film₁ and, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the first pixel electrode, and the second pixel electrode is formed on a light reflective region of the insulation film₂ and

at least a portion corresponding to a side wall surface of the hole formed in the insulation film is shielded from light.

2. (currently amended) A display device according to claim 1, wherein the first pixel electrode and the second pixel electrode are formed on one of a pair of substrates which are arranged to face each other in an opposed manner with liquid crystal disposed therebetween₁ and, a light shielding film which is positioned below the insulation film is provided to at least the portion corresponding to the side wall surface of the hole formed in the insulation film.

3. (currently amended) A display device according to claim 1, wherein the first pixel electrode and the second pixel electrode are formed on one of a pair of substrates which are arranged to face each other in an opposed manner with liquid

crystal disposed therebetween₁ and₇ a light shielding film is provided to a portion corresponding to a side wall surface of a hole formed in the insulation film of the other substrate of the respective substrates.

4. (currently amended) A display device ~~being~~ characterized in that:
on one of ~~respective~~ a pair of substrates which are arranged to face each other with liquid crystal disposed therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed_{7i};

regions surrounded by these respective signal lines constitute pixel regions, and each pixel region includes a switching element₁ which is operated in response to a scanning signal received from the a gate signal line₁ and a pixel electrode to which a video signal is supplied from ~~the~~ a drain signal line through the switching element_{7i};

the pixel electrode is constituted of a first pixel electrode formed of a light transmissive conductive layer₁ which is formed in a light transmissive region which constitutes one region after-resulting from partitioning the pixel region₁ and a second pixel electrode formed of a non-light transmissive conductive film₁ which is formed in a light reflective region which constitutes the ~~other~~ remainder of the pixel region after partitioning the pixel region_{7i};

the first pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the first pixel electrode, the second pixel electrode is formed in the light reflective region of the insulation film_{7i} and

a light shielding film₁ which is positioned as a layer below the insulation film₁ is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film.

5. (currently amended) A display device according to the claim 4, wherein the light shielding film is made of ~~a~~the same material ~~equal to a~~as the material of the gate signal lines.

6. (currently amended) A display device ~~being~~ characterized in that: on one of ~~respective~~a pair of substrates which are arranged to face each other with liquid crystal therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed;_i

regions surrounded by the respective signal lines constitute pixel regions, and each pixel region includes a switching element_i which is operated in response to a scanning signal received from the gate signal line_i and a pixel electrode to which a video signal is supplied from ~~the~~a drain signal line through the switching element;_i

the pixel electrode is constituted of a first pixel electrode formed of a non-light transmissive conductive layer_i which is formed in a light reflective region ~~formed~~ surrounding a light transmissive region_i and a second pixel electrode formed of a light transmissive conductive layer which is formed on the light reflective region;_i

the second pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the second pixel electrode, the first pixel electrode is formed in the light reflective region of the insulation film;_i

a light shielding film_i which is positioned as a layer below the insulation film_i is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film;_i and;

the light shielding film is formed as a layer below the second pixel electrode₁ and, at the same time, there exists a portion where the light shielding layer is not formed at a part of the portion corresponding to the side wall surface of the hole formed in the insulation film.

7. (currently amended) A display device being characterized in that:
on one of ~~respective~~ a pair of substrates which are arranged to face each other with liquid crystal therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed;_i

regions surrounded by these respective signal lines constitute pixel regions, and each pixel region includes a switching element₁ which is operated in response to a scanning signal received from ~~the~~ a gate signal line₁ and a pixel electrode to which a video signal is supplied from ~~the~~ a drain signal line through the switching element;_i

the pixel electrode is constituted of a first pixel electrode formed of a non-light transmissive conductive layer₁ which is formed in a light reflective region ~~formed~~ surrounding a light transmissive region and a second pixel electrode formed of a light transmissive conductive layer which is formed on the light reflective region;_i

the second pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the second pixel electrode, the first pixel electrode is formed in the light reflective region of the insulation film;_i

a light shielding film₁ which is positioned as a layer below the insulation film₁ is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film;_i and;₇

the light shielding film is made of a material ~~equal~~ similar to a ~~the~~ material of the gate signal lines and is formed as a layer below the second pixel electrode₁ and, at the same time, there exists a portion where the light shielding layer is not formed at a part of the portion corresponding to the side wall surface of the hole formed in the insulation film₁ and ~~the~~ this portion includes a portion which is close to the switching element.

REMARKS

The specification has been amended to correct errors of a typographical and grammatical nature. Due to the large number of corrections thereto, applicants submit herewith a Substitute Specification, along with a marked-up copy of the original specification for the Examiner's convenience. Applicants submit that the substitute specification includes no new matter. Therefore, entry of the Substitute Specification is respectfully requested.


The abstract has been amended to correct errors of a grammatical nature, and the claims have been amended to more clearly describe the features of the present invention.

Applicants also submit herewith, by separate letter, the certified copy of the priority document.

Entry of the preliminary amendments and examination of the application is respectfully requested.

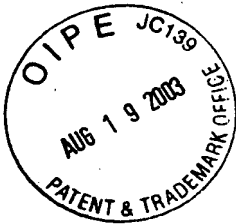
To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (501.42963X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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DISPLAY DEVICE

BACKGROUND OF THE INVENTION

~~1. FIELD OF THE INVENTION~~

The present invention relates to a liquid crystal display device, and more particularly, to a liquid crystal display device which is referred to as a ^{of the} ~~partial transmissive type~~, in which it is possible to eliminate a frame-like luminescence difference around the periphery of the light transmissive region in each pixel.

~~2. DESCRIPTION OF THE RELATED ART~~

^A ~~The~~ liquid crystal display device, which is referred to as the partial transmissive type is used as a miniaturized liquid crystal display device for a mobile telephone or the like. This liquid crystal display device ^{allows} ~~can make~~ a user ^{to} recognize images on a display screen using light made ^{up} ~~of~~ ^{the} reflective light of sun (a light reflection mode) or using light ^{from} ~~of~~ a backlight incorporated in the liquid crystal display device (a light transmissive mode), depending on the ^{conditions existing at the location} ~~situation~~ where the liquid crystal display device ^{is} ~~is~~ used.

^{in a typical liquid crystal display device, a pair of} That is, ~~out of respective~~ transparent substrates ^{which} are arranged to face each other in an opposed manner with ^a liquid layer disposed therebetween. ^{On} ~~on~~ a liquid-crystal-side surface of one transparent substrate, regions which are ^{defined} ~~surrounded~~ by gate signal lines which extend in the x direction and are juxtaposed in the y direction and drain signal lines which extend in the y direction and are juxtaposed in the x direction constitute

pixel regions. In each pixel region, ^{there is} a switching element, which is driven by supplying a scanning signal from one gate signal line, ^{there is} and a pixel electrode to which a video signal is supplied from one drain signal line through the switching element ~~are~~ ~~formed~~.

The pixel electrode is formed of a light transmissive conductive layer made of ITO (Indium-Tin-Oxide), for example, in one region ~~defined in~~ ^{of} the pixel region, and ^{it} is formed of a non-light transmissive conductive layer, such as a metal layer made of Al or the like, in the ~~other region defined in~~ ^{remainder of} the pixel region.

~~Here, the pixel electrode generates~~ ^{is generated} ~~an~~ ^A electric field between the pixel electrode and a counter electrode, which is formed in common with ~~respect to~~ respective pixel regions and is formed of a light transmissive conductive layer on a liquid-crystal-side surface of the other transparent substrate, ^{whereby the} ~~and~~ liquid crystal within the pixel region is activated in response to the electric field.

In this case, a portion ^{of the pixel area} in which the light transmissive pixel electrode is formed is used as a light transmissive region and a portion ^{of the pixel area} in which the non-light transmissive pixel electrode is formed is used as a light reflective region.

^{a liquid crystal display device having} Further, in such a constitution, ^{there is a} ~~it has been~~ known ~~an~~ technique ^{in which} ~~that~~ the pixel electrode formed of the light transmissive conductive layer is arranged below an insulation

film, a hole is formed in ^{the} ~~an~~ insulation film in a region corresponding to the light transmissive region so as to expose the pixel electrode formed of the light transmissive conductive layer, and ^a ~~the~~ pixel electrode formed of the non-light transmissive conductive film is formed in a region above the insulation film and ^{outside} ~~excluding~~ the light transmissive region, that is, ⁱⁿ ~~the~~ light reflective region.

Here, the reason ^{why} ~~that~~ the hole is formed in the region corresponding to the light transmissive region of the insulation film is to make ^{the} ~~a~~ length of an optical path of light which passes ^{through} ~~the inside of~~ liquid crystal in the light transmissive region substantially equal to ^{the} ~~a~~ length of an optical path of light which ^{through} ~~passes the inside of~~ liquid crystal in the light ^{reflective} ~~transmissive~~ region.

SUMMARY OF THE INVENTION

However, with respect to the liquid crystal display device having such a constitution, it has been found that a frame-like luminance difference is generated ^{at the} ~~in~~ periphery of the hole formed in the insulation film (light transmissive region) at the time of ^{image} ~~display~~.

As a result of ^{an} ~~the~~ extensive study of ^{the} ~~causes~~ of such a phenomenon, it has been found ~~out~~ that, since a steep stepped portion is formed at a portion corresponding to a side wall surface of the hole formed in the insulation film, ^a ~~the~~ disturbance of

the orientation of the liquid crystal is liable to be easily generated, whereby, at the time of ~~performing~~^{producing} a black display in the light transmissive mode, for example, ~~the~~^a complete black display cannot be obtained in such a portion, thus giving rise to the above-mentioned drawback.

The present invention has been made in view of such circumstances, and it is an object of the present invention to provide a liquid crystal display device, which ~~can~~^{it is possible to} prevent the generation of ~~the~~^a frame-like luminance difference in a portion which surrounds ~~a~~^{the} light transmissive region.

~~To briefly explain the summary of typical inventions among~~^{aspects of the} invention disclosed in this specification, ~~they are~~^{is} as follows.

Means 1.

In a liquid crystal display device according to the present invention, for example, in a pixel region formed on a substrate, a first pixel electrode formed of a light transmissive conductive layer is formed in one optical transmissive region, which is formed by partitioning the pixel region, and a second pixel electrode formed of a non-light transmissive conductive film is formed ~~on the other~~^{remainder of the pixel region, representing a} light reflective region.

The first pixel electrode is positioned as a lower layer with respect to an insulation film, and, at the same time, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the first pixel electrode, and ~~the~~^a second pixel electrode is formed on a light

reflective region of the insulation film, and

at least a portion corresponding to a side wall surface of the hole formed in the insulation film is shielded from light.

Means 2.

The liquid crystal display device according to the present invention is, for example, on the premise of the constitution of means 1, characterized in that on one of a pair of substrates which are arranged to face each other in an opposed manner with liquid crystal ^{disposed} therebetween, the first pixel electrode and the second pixel electrode are formed, and, at the same time, a light shielding film, which is positioned below the insulation film, is provided to at least the portion corresponding to the side wall surface of the hole formed in the insulation film.

Means 3.

The liquid crystal display device according to the present invention is, for example, on the premise of the constitution of means 1, characterized in that on one of a pair of substrates which are arranged to face each other in an opposed manner with liquid crystal ^{disposed} therebetween, the first pixel electrode and the second pixel electrode are formed, and, at the same time, a light shielding film is provided to a portion corresponding to a side wall surface of a hole formed in the insulation film of the other substrate of the respective substrates.

Means 4.

The liquid crystal display device according to the present

invention is, for example, characterized in that on one of ^{the} respective substrates which are arranged to face each other with liquid crystal ^{deposited} therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed,

regions surrounded by these respective signal lines constitute pixel regions, and each pixel region includes a switching element which is operated in response to a scanning signal ^{received} from the gate signal line and a pixel electrode to which a video signal is supplied from the drain signal line through the switching element,

the pixel electrode is constituted of a first pixel electrode formed of a light transmissive conductive layer formed in a light transmissive region which constitutes one region ^{formed by} ~~after~~ partitioning the pixel region and a second pixel electrode formed of a non-light transmissive conductive film, which is formed of a light reflective ^{film in a} region which constitutes the ^{remaining} ~~other~~ region after partitioning the pixel region,

the first pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the first pixel electrode, the second pixel electrode is formed in the light reflective region of the insulation film, and

a light shielding film, which is positioned as a layer below

the insulation film, is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film.

Means 5.

The liquid crystal display device according to the present invention is, for example, on the premise of the constitution of means 4, characterized in that the light shielding film is made of a material ^{similar} ~~equal~~ ^{to} ~~a~~ material of the gate signal lines.

Means 6.

The liquid crystal display device according to the present invention is, for example, characterized in that on one of ^{the} _Λ respective substrates which are arranged to face each other with liquid crystal ^{disposed} therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed, regions surrounded by these respective signal lines constitute pixel regions, and each pixel region includes a switching element which is operated in response to a scanning signal ^{received} from the gate signal line and a pixel electrode to which a video signal is supplied from the drain signal line through the switching element,

the pixel electrode is constituted of a first pixel electrode formed of a non-light transmissive conductive layer, which is formed in a light reflective region ~~formed~~ surrounding a light transmissive region, and a second pixel electrode formed

of a light transmissive conductive layer which is formed on the light reflective region,

the second pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the second pixel electrode, the first pixel electrode is formed in the light reflective region of the insulation film,

a light shielding film, which is positioned as a layer below the insulation film, is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film and,

the light shielding film is formed as a layer below the second pixel electrode, and, at the same time, there exists a portion where the light shielding layer is not formed at a part of the portion corresponding to the side wall surface of the hole formed in the insulation film.

Means 7.

The liquid crystal display device according to the present invention is, for example, characterized in that on one of ^{the} respective substrates which are arranged to face each other with liquid crystal ^{disposed} therebetween, a plurality of juxtaposed gate signal lines and a plurality of juxtaposed drain signal lines which cross the respective gate signal lines are formed,

regions surrounded by these respective signal lines

constitute pixel regions, and each pixel region includes a switching element which is operated in response to a scanning signal ^{received} from the gate signal line and a pixel electrode to which a video signal is supplied from the drain signal line through the switching element,

the pixel electrode is constituted of a first pixel electrode formed of a non-light transmissive conductive layer which is formed in a light reflective region ~~formed~~ surrounding a light transmissive region and a second pixel electrode formed of a light transmissive conductive layer which is formed on the light reflective region,

the second pixel electrode is positioned as a lower layer with respect to an insulation film, a hole is formed in the insulation film in a region corresponding to the light transmissive region so as to expose the second pixel electrode, the first pixel electrode is formed in the light reflective region of the insulation film,

a light shielding film which is positioned as a layer below the insulation film is provided to at least a portion corresponding to a side wall surface of the hole formed in the insulation film and,

the light shielding film is made of a material ^{similar} ~~equal~~ to ^{the} ~~a~~ material of the gate signal lines and is formed as a layer below the second pixel electrode, and, at the same time, there exists a portion where the light shielding layer is not formed

at a part of the portion corresponding to the side wall surface of the hole formed in the insulation film and the portion includes a portion which is close to the switching element.

It is needless to say that the present invention is not limited to the above-mentioned ^{examples,} ~~constitution~~ and ^{that} various modifications can be made without departing from the technical concept of the present invention.

ALL CAPS *→* Brief Description of the Several ~~Views of the~~ Drawings

^{diagrammatic}
Fig. 1 is a plan view showing one embodiment of a pixel of a liquid crystal display device according to the present invention.

Fig. 2 is a cross-sectional view taken along a line II-II in Fig. 1.

^{diagram illustrating}
Fig. 3 is a cross-sectional ~~view~~ ^{for} explaining an advantageous effect of the present invention.

^{diagrammatic}
Fig. 4 is a plan view showing another embodiment of ^a ~~the~~ pixel of the liquid crystal display device according to the present invention.

^{diagrammatic}
Fig. 5 is a plan view showing another embodiment of ^a ~~the~~ pixel of the liquid crystal display device according to the present invention.

^{diagram}
Fig. 6 is a cross-sectional ~~view~~ showing another embodiment of ^a ~~the~~ pixel of the liquid crystal display device according to

the present invention.

ALL CAPS Detailed Description of the Invention

Hereinafter, ~~embodiments~~^{various} of the liquid crystal display device according to the present invention ~~are~~^{will be} explained in conjunction with the drawings.

Embodiment 1.

Fig. 1 is a plan view showing one embodiment of the constitution of a pixel of a liquid crystal display device according to the present invention. Further, Fig. 2 is a cross-sectional view taken along a line II-II in Fig. 1.

~~as seen~~
Pixels in these drawings are formed within regions which are ~~surrounded~~^{defined} by gate signal lines GL, which extend in the x direction and are juxtaposed in the y direction ~~in the drawing~~, and ~~the~~ drain signal lines DL, which extend in the y direction and are juxtaposed in the x direction (pixel regions) ~~in the drawing~~.

First, the above-mentioned gate signal lines GL are formed on the liquid-crystal-side surface of the transparent substrate SUB1. The gate signal line GL has a portion which is extended slightly to the pixel region side and this extended portion forms a gate electrode GT of a thin film transistor TFT ~~which~~^{as} will be ~~explained~~^{in more detail} later. This gate signal line GL and the gate electrode GT are made of, for example, aluminum (Al) or an alloy thereof and ~~a~~^{an} anodized film formed by anodizing the surface of

the aluminum or alloy.

Further, a capacitive signal line CL, extending in the x direction in the drawing, is formed in the pixel region, and this capacitive signal line CL is arranged in the vicinity of the gate signal line GL, which is positioned, for example, in the upper portion of the drawing. This capacitive signal line CL has a portion which extends comparatively largely to the center side of the pixel region, and the extended portion forms an electrode CT1, which constitutes one ^{part} of the capacitive element Cstg, which will be explained later. This capacitive signal line CL and the electrode CT1 are formed, for example, in the same ^{fabrication} ^{used for fabrication of} step as the above-mentioned gate signal line GL, and the materials thereof are also made of aluminum (Al) or an alloy thereof and an anodized film formed by anodizing a surface of the material.

Further, although the pixel according to this embodiment is configured such that, for example, a light transmissive region LTA is formed in an approximate center of the region and a light reflective region LRA is formed ^{to} surround ~~the~~ the light transmissive region LTA, in this embodiment, a light shielding layer ^{ILI} ~~III~~ having a given width is formed at a ^{location} ~~portion~~ corresponding to a boundary portion between the light transmissive region LTA and the light reflective region LRA. This light shielding layer ^{ILI} ~~III~~ is formed in the same ^{fabrication} ^{used in fabrication of} step as the above-mentioned gate signal line GL, for example, and the material of the light shielding layer ^{ILI} ~~III~~ is aluminum (Al) or an alloy thereof, wherein no anodized

film is formed on a surface of ^{the} light shielding layer ^{III}~~III~~. This is because ~~that~~ the light shielding layer ^{III}~~III~~ is formed in an island shape independently in the pixel region, and hence, it is difficult to anodize the light shielding layer ^{III}~~III~~. However, it is not a drawback for the light shielding layer ^{III}~~III~~ that no anodized film is formed on the surface of the light shielding layer ^{III}~~III~~. The functions of ^{this} ~~the~~ light shielding layer will be explained in ^{more} detail later.

A light transmissive conductive layer made of, for example, ITO (Indium Tin Oxide), ITZO (Indium Tin Zinc Oxide), IZO (Indium Zinc Oxide), SnO₂ (Tin Oxide), In₂O₃ (Indium Oxide) or the like is formed in ~~an~~ approximately half of the pixel region at the thin film transistor TFT side. As will be clearly understood from ^{an} ~~the~~ explanation which will be ^{provided} ~~made~~ later, the light transmissive conductive layer is formed such that the light transmissive conductive layer covers the light transmissive region LTA ^{sufficiently to provide the function} ~~enough for playing a role~~ of a pixel electrode PX (T) in the light transmissive region LTA.

Further, for example, simultaneously with the formation of the light transmissive conductive layer, ^a ~~the~~ light transmissive conductive layer is also formed on an upper surface of an electrode CT1 of the capacitive element Cstg, and this light transmissive conductive layer constitutes another electrode CT2 of the capacitive element Cstg. In this case, between these electrodes ^{there is} CT1 and CT2, ^{disposed} an anodized film on a surface of the

electrode CT1 ~~is interposed~~, and the anodized film constitutes one of dielectric films of the capacitive element Cstg.

Further, a sequential laminated body formed of a gate insulation film GI and a semiconductor layer AS, which is made of amorphous Si, is formed such that the sequential laminated body ^{extends} ~~strides~~ over the gate electrode GT. The gate electrode GT, the gate insulation film GI and the semiconductor layer AS are members which constitute a thin film transistor TFT. That is, by forming a drain electrode and a source electrode on the semiconductor layer AS, a MIS (Metal Insulator Semiconductor) transistor having a so-called inversely staggered structure is formed.

Further, the sequential laminated body formed of the gate insulation film GI and the semiconductor layer AS extends over the whole area of the region in which the drain signal line DL ~~which will be mentioned later~~ is formed. Accordingly, in the formation of the drain signal line DL, the drain signal line DL is formed on a portion having no stepped portion. This can prevent the occurrence of a broken step in the drain signal line DL, which may be caused by the stepped portion.

Further, in a portion where a conductive state is established between the light transmissive conductive layer constituting the pixel electrode PX(T) in the light transmissive region LTA and the light transmissive conductive layer constituting the electrode CT2 of the capacitive element Cstg,

a sequential laminated body formed of a gate insulation film GI' and a semiconductor layer AS' is formed, and the above-mentioned conductive state is established through a hole formed in the sequential laminated body. In this case, the conductive state is, for example, established by a conductive layer SD, which is made of ~~a material equal to a material of the~~ ^{the same} ~~as that of~~ the drain signal line DL at the time of forming the drain signal line DL, which will be formed ~~by~~ ⁱⁿ a following step, for example. The reason that the conductive state is established between the light transmissive conductive layer constituting the pixel electrode PX (T) and the light transmissive conductive layer constituting the electrode CT1 of the capacitive element Cstg using such a comparatively complicated ~~constitution~~ ^{construction} is to relax the stress generated due to the relationship with materials constituting the electrode CT1 of the capacitive element Cstg or the like.

Here, the gate insulation film GI' and the semiconductor layer AS' are formed simultaneously with the formation of the gate insulation film GI and the semiconductor layer AS, in the region where the thin film transistor TFT is formed, for example.

Then, the drain signal lines DL, which extend in the y direction and are juxtaposed in the x direction in the drawing, are formed. As mentioned above, these drain signal lines DL are formed on the sequential laminated bodies of the gate insulation films GI and the semiconductor layers AS, and hence,

the drain signal lines DL can be formed ^{so as to obviate} ~~obviating~~ the possibility of occurrence of broken steps at stepped portions because of the flatness of the sequential laminated bodies.

~~Further,~~ ^A An extended portion, which extends to a position above the semiconductor layer AS, is formed at a portion of the drain signal line DL, and this extended portion is configured to form the drain electrodes SD1 of the thin film transistor TFT.

Further, along with the formation of the drain signal line DL, the source electrode SD2 is formed in a spaced-apart manner from the drain electrode SD1 by a length corresponding to a channel length of the thin film transistor TFT. The source electrode SD2 has an extended portion which extends to a position above the pixel electrode PX (T). This extended portion ~~is~~ ^S also served ^A ~~to establish a~~ for the connection with the pixel electrode PX (R), as will be explained later.

~~Further,~~ ^A As described previously, during the formation of the drain signal lines DL, the conductive layer SD ^{is formed} for establishing the conductive state between the light transmissive conductive layer constituting the pixel electrode PX (T) in the light transmissive region LTA and the light transmissive conductive layer constituting the electrode CT2 of the capacitive element Cstg ~~is formed~~.

Then, on a surface of the transparent substrate SUB1 having such a constitution, an inorganic protective film PAS1, which

constitutes one of the protective films PAS, is formed using a silicon nitride film or the like, for example. In this inorganic protective film PAS1, in the vicinity of the thin film transistor TFT, a hole CH1 which is ^{provided to ensure} ~~served for ensuring~~ a contact with the pixel electrode PX (R) ^{is} ~~which~~ will be explained later, and an opening portion HL1 which is ^{used to expose} ~~served for exposing~~ the light transmissive region LTA are formed.

Further, on a surface of the inorganic protective film PAS1, an organic protective film PAS2 is formed using a material such as resin or the like, for example. The above-mentioned inorganic protective film PAS1 and this organic protective film PAS2 collectively constitute a protective film PAS for mainly obviating ~~the~~ direct contact between the thin film transistor TFT and the liquid crystal. This ~~provision~~ is provided for decreasing the dielectric constant of the protective film PAS as a whole.

In the organic protective film PAS2, at a portion thereof where the hole CH1 is formed in the inorganic protective film PAS1, a hole CH2 ^{is formed} which is smaller than the hole CH1 and shares the same central axis with the hole CH1 ~~is formed~~. Further, in the organic protective film PAS2, at a portion where the opening portion HL1 is formed in the inorganic protective film PAS1, ^{is formed} an opening portion HL2 which is smaller than the opening portion HL1 and shares the same central axis with opening portion HL1 ~~is formed~~.

Here, the opening portion HL2 formed in the organic protective film PAS2 constitutes the light transmissive region LTA in the pixel region and the pixel electrode PX (T), which is exposed through the opening portion HL2, functions as the pixel region PX in the light transmissive region LTA.

Further, the reason why the opening portion HL2 is formed in the region corresponding to the light transmissive region LTA of the organic protective film PAS2 is to make ~~a~~^{the} length of an optical path of light passing through the liquid crystal in the light transmissive region LTA and ~~a~~^{the} length of an optical path of light passing through the liquid crystal in the light reflective region LRA substantially equal.

Further, on a surface of the organic protective film PAS2, that is, on the region corresponding to the light reflective region LRA, the pixel electrode PX (R), which also functions as a reflector, is formed. The pixel electrode PX (R) is made of, for example, Al, an alloy thereof or a laminated body including Al or the alloy. In any case, the pixel electrode PX (R) is made of a material having a favorable reflective efficiency (reflectance), while, when the pixel electrode PX (R) is formed in the laminated body, the pixel electrode PX (R) constitutes a top layer of the laminated body.

Further, the pixel electrode PX (R) is connected to the source electrode SD2 of the thin film transistor TFT through the hole CH2 formed in the protective film PAS2 and is configured

to function as an electrode having the protective films PAS1, PAS2 as dielectric films between the pixel electrode PX (R) and the electrode CT2 in the region where the capacitive elements are formed. Accordingly, the capacitive element Cstg having a two-stage constitution is formed between the capacitive signal line CL and the pixel electrode PX (R), and, hence, although the occupied region of the pixel electrode PX (R) is small, the pixel electrode PX (R) can obtain a large capacity.

Further, on a surface of the transparent substrate SUB1 having such a constitution, an orientation film is formed, and this orientation film determines the initial orientation of molecules of the liquid crystal ~~which~~^{and} is brought into direct contact with the liquid crystal.

In the liquid crystal display device having such a constitution, the light shielding layer ILI is formed, as shown in Fig. 1, on the boundary portion between the light transmissive region LTA and the light reflective region LRA.

The light transmissive region LTA is constituted of a portion where an opening ~~portion~~ is formed in the protective film PAS and the light reflective region LRA is constituted of a portion where the protective film PAS is formed. Accordingly, the boundary portion of the light transmissive region LTA and the light reflective region LRA corresponds to the side wall surface of the opening portion of the protective film PAS, and, hence, the orientation of the liquid crystal is not sufficiently

~~performed~~^{achieved} in this boundary portion. This is because it is difficult^{at this location} to perform the rubbing treatment of the orientation film with accuracy.

Accordingly, when ~~the~~^a black display is ~~performed~~^{produced} in the light transmissive region LTA, ~~the~~^a complete black display is not ~~performed~~^{produced} on the ~~portion~~^{peripheral thereof} and a frame-like pattern is recognized by ~~a~~^{the} naked eye. In view of the above, the light shielding layer ILI is formed on this portion for overcoming the above-mentioned drawback.

Fig. 3 is a view showing a cross section at the boundary portion of the light transmissive region LTA and the light reflective region LRA. An orientation film ORI1, which is arranged to be in contact with the liquid crystal, cannot receive the appropriate rubbing treatment on the side wall surface of the opening portion HL2 formed in the organic protective film PAS2 and the bottom surface in the vicinity of the side wall surface. Accordingly, the liquid crystal (shown as A in the drawing) in this portion cannot exhibit the proper behavior, and, hence, for example, when ~~the~~^a black display is ~~performed~~^{produced} in the light transmissive region LTA, ~~the~~^a complete black display cannot be obtained^{at this location} ~~on the portion~~.

Accordingly, the light shielding layer ILI is formed on the portion where ~~the~~ proper rubbing treatment cannot be performed. In the ~~manufacturing~~^{fabrication} steps of the liquid crystal display device, it is difficult to form the light shielding layer

only on the region where the appropriate rubbing treatment cannot be performed. In the cross-sectional view shown in Fig. 3, considering the displacement of the position ^{which occurs during manufacture} in the manufacturing steps of the liquid crystal display device, an end portion of the opening portion HL2 of the organic protective film PAS2 is arranged on the light shielding layer ILI. The light shielding layer ILI is formed such that the light shielding layer ILI ^{extends} ~~strides~~ over the light reflective region LRA and the light transmissive region LTA, and hence, it is possible to ensure ~~the~~ light shielding in the region where the appropriate rubbing treatment cannot be performed. Further, in the liquid crystal display device shown in Fig. 3, since the protective film PAS2 is formed over the light shielding layer ILI, the light shielding region can be narrowed. Accordingly, the luminance of a display screen in a light transmissive mode, as well as in a light reflective mode, can be enhanced.

~~Here,~~ Fig. 3 also shows the transparent substrate SUB2 which is arranged over the transparent substrate SUB1, with the liquid crystal LC ^{disposed} therebetween. Color filters FIL, an overcoat film OC, a counter electrode CT and an orientation film ORI2 are formed on a liquid crystal side surface of the transparent substrate SUB2.

Further, in this embodiment, the light shielding layer ILI is constituted such that the light shielding layer ILI is not formed in the vicinity of the thin film transistor TFT.

The reason why this constitution is adopted is that, first, by forming the portion where the light shielding layer ILI is not formed on the boundary portion between the light transmissive region LTA and the light reflective region LRA, the region ^{is formed} in which the pixel electrode PX (T) formed of the light transmissive conductive layer does not ^{extend} ~~stride~~ over the light shielding layer ILI ~~is formed~~. The pixel electrode PX (T) has characteristics ^{such} that the pixel electrode PX (T) is easily broken at a stepped portion. This constitution can prevent the electrical disconnection between the pixel electrode PX (T) formed in the light transmissive region LTA and the source electrode SD2 of the thin film transistor TFT, which is caused by the broken step.

Further, another reason ^{why} ~~that~~ the portion where the light shielding layer ILI is not formed is arranged particularly close to the thin film transistor TFT is to ^{space} ~~make~~ the light shielding layer ILI and the gate electrode GT of the thin film transistor TFT further ^{from} ~~space~~ apart each other eventually so as to obviate ^{an} ~~the~~ electrical connection between them.

Embodiment 2.

Fig. 4 is a plan view showing another embodiment of the pixel of the liquid crystal display device according to the present invention, ^{similar} ~~and corresponds to~~ ^{that of} Fig. 1.

The constitution which makes this embodiment different from the embodiment shown in Fig. 1 lies in ^{the fact} ~~that~~ the light shielding layer ILI is ~~not~~ formed not only in the vicinity of the thin

film transistor TFT within the boundary portion between the light transmissive region LTA and the light reflective region LRA, but also in other portions within such a boundary portion, for example, in the vicinity of the capacitive element Cstg.

This constitution is provided for eliminating, with high probability, the drawback ^{occurs when} that the pixel electrode PX (T) ^{extending over} ~~which~~ ^{is such that it} is formed by ~~striding over~~ the light shielding layer ILI is broken at the stepped portion of the light shielding layer ILI.

Embodiment 3.

Fig. 5 is a plan view showing another embodiment of ^a ~~the~~ pixel of the liquid crystal display device according to the present invention and ^{it shows an arrangement similar} ~~corresponds~~ ^{that of} to Fig. 1.

The constitution which makes this embodiment different from the embodiment shown in Fig. 1 ^{the fact} lies in that the light shielding layer ILI is formed continuously along the whole area of the boundary portion between the light transmissive region LTA and the light reflective region LRA.

This embodiment is based on the understanding that ^{is} ~~the~~ drawback which is generated ^{when} ~~by the constitution that~~ the pixel electrode PX (T) is formed ^{is extended} ~~striding over~~ the light shielding layer ILI can be eliminated by any means, it is unnecessary for the boundary portion between the light transmissive region LTA and the light reflective region LRA to have a portion where the light shielding layer is not formed ^{along that} ~~in a portion of the~~ boundary.

Here, as the means for eliminating such a drawback, for

example, by forming the light shielding layer ILI above the pixel electrode PX (T), there is no fear that the pixel electrode PX (T) ^{will be} ~~is~~ broken at the stepped portion, and hence, in this case, the light shielding layer ILI can be formed continuously along the whole boundary portion between the light transmissive region LTA and the light reflective region LRA.

Embodiment 4.

Fig. 6 is a ~~constitutional~~ view showing another embodiment of ^a ~~the~~ pixel of the liquid crystal display device according to ^{it shows an arrangement similar} ~~that of~~ the present invention and ~~corresponds~~ to Fig. 3.

The constitution which makes this embodiment different from the embodiment shown in Fig. 3 lies in ^{the fact} that the light shielding film ILI extends over the light reflective region LRA. In other words, the light shielding film ILI is formed such that the light shielding film ILI extends outwardly from the light transmissive region LTA.

This embodiment is made based on the understanding that the extended portion forms a portion of the light reflective region LRA, and hence, the extended portion ^{effects} ~~gives~~ no influence on the display.

Embodiment 5.

~~Further,~~ ^A Although the light shielding layer ILI is formed on the transparent substrate SUB1 side in ^{emb of} the above-mentioned ~~respective~~ embodiments, the present invention is not limited to such a constitution. That is, it is also possible to ^{achieve} ~~have~~

~~the~~ substantially ^{the} same advantageous effects by forming the light shielding layer ILI on the corresponding portion of the transparent substrate SUB2 side.

Embodiment 6.

~~Further~~ ^{In each of} the above-mentioned ~~respective~~ embodiments, the light transmissive region LTA is positioned at the center of the pixel region and the light reflective region LRA is formed ~~at~~ ^{around} the periphery of the light transmissive region LTA. However, it is needless to say that, for example, ~~even when~~ using an imaginary line which extends in the x direction in the drawing ^{even when} as a boundary, the light reflective region LRA is formed above the boundary and the light transmissive region LTA is formed below the boundary, the present invention is applicable to the boundary portion of the light reflective region LRA and the light transmissive region LTA.

As can be clearly understood from the foregoing explanation, ⁱⁿ the liquid crystal display device according to the present invention, ~~can prevent~~ ⁹ the occurrence of ~~the~~ frame-like luminance difference in the portion which surrounds the light transmissive region. ^{can be prevented}